Unbundling and Measuring Tunneling

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What is “Tunneling”? 

• Generic term for variety of strategies
  – For insiders to extract more than pro-rata share of firm value
• **Not** same as “private benefits of control”
  – Non-pecuniary private benefits ≠ tunneling
• **Not** “expropriation”
  – Whether minority shareholders are cheated depends on the price they paid
  – Expected tunneling → lower share prices
Talk based on

Four Main Types of Tunneling

• Cash flow tunneling
  – transfer pricing
  – excess (recurring) insider compensation

• Asset tunneling “out” (asset stripping)

• Asset tunneling “in” (overpay for assets)

• Equity tunneling
  – dilution
    • Including excessive equity-based compensation
  – Freezeout minority shareholders

• Mixed types
  – loans to insiders (not repaid in bad states of world)
Equilibrium Model of Tunneling

• Investors pay fair price on average
  – But not in each case
  – Leads to adverse selection
    • Overpay if tunneling occurs
    • Underpay if it does not
  – Controller incentives to tunnel ex post
    • Especially if weak disclosure
• Different tunneling types affect different financial metrics
• Illustrate model with case studies: Coke, Gazprom
• Tunneling risk as asset pricing factor
Guidance for Investors; Role of Regulation

• guidance for investors, researchers, advisors:
  • how to use financial metrics to assess tunneling risk
  • impact on share values
  • Tunneling risk as asset pricing factor

• guidance for regulators
  • what disclosures would help investors assess tunneling events
  • Better disclosure → weaker tunneling incentives
  • reforms to limit tunneling

• Different laws/rules limit each type of tunneling
  – US not very strong
    • Anti-tunneling culture works at most firms, but not all
  – Hong Kong?
Tree Grove Analogy

Equity Tunneling  Asset Tunneling  Cash Flow Tunneling

Fruit Growers Company

Controllers, Co.
Impact on Share Value

• Simple, algebraic model
• Goal: High ratio of intuition to algebra
• Assume zero-growth, no taxes, no debt,
• Cost of capital $K_0$ (w/o tunneling)
  – first order = indep. of tunneling risk
• “Intrinsic” value, no tunneling:

$$IV_{no-tun} = \frac{EBIT}{\text{cost of capital}} = \frac{ROA_0 \cdot A_0}{K_0}$$
Cash-flow tunneling

- Controller diverts fraction \( d_{cf} \) of EBIT (steady state)
- Share price drops by factor \((1 - d_{cf})\)

\[
MV_{0, CF\, tun} = \frac{(1 - d_{cf}) \cdot ROA_0 \cdot A_0}{K_0}
\]

- **Transfer pricing**: 
  - depresses gross margin \((\text{sales-COGS})/\text{sales}\) and operating margin \((\text{EBIT}/\text{sales})\)
- **Excess executive comp**, Non-operating services (G&A)
  - depresses only operating margin
- **Both types**:
  - **Reduce** ROA \((\text{EBIT}/\text{assets})\), Tobin’s q \((\text{MV}/\text{assets})\)
  - **No direct effect** on P/E: similar effect on both P and E
Expected future asset tunneling (in or out)

• Combined effect of probability and magnitude
  – probability = \( \pi_{a, pre} \); fraction of value = \( d_a \)
  – lower post-tunneling value of remaining assets (lose synergy) = factor \((1-d_{syn})\)

\[
MV_{0, asset\ tun} = \frac{(1 - \pi_{a, pre} d_a) \cdot (1 - \pi_{a, pre} d_{syn}) \cdot ROA_0 \cdot A_0}{K_0}
\]

– **Affects:** metrics based on price (P/E, q)
– **Doesn’t affect:** financial statement metrics
  • Hasn’t happened yet
Realized asset tunneling

- Expected future probability and discount change [d becomes d’]
- ROA$_1$ and A$_1$ incorporate past tunneling

$$MV_{1,asset\ tun} = \frac{(1 - \pi_{a,post} d'_\text{syn}) \times (1 - \pi_{a,post} d'_a) \times ROA_1 \times A_1}{K_0}$$

- Effect on metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Asset tunneling “out”</th>
<th>Asset tunneling “in”</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/E; Tobin’s q</td>
<td>Tends to decline</td>
<td>Tends to decline</td>
</tr>
<tr>
<td>Gross margin</td>
<td>No direct effect</td>
<td>No direct effect</td>
</tr>
<tr>
<td>Operating margin (EBIT/sales)</td>
<td>No direct effect</td>
<td>Lower margin on new sales (higher depreciation)</td>
</tr>
<tr>
<td>EBITDA/sales</td>
<td>No direct effect</td>
<td>No direct effect</td>
</tr>
<tr>
<td>ROA (EBIT/assets)</td>
<td>falls: EBIT drops more than assets</td>
<td>falls with dual impact: Lower margin, higher assets</td>
</tr>
<tr>
<td>Asset turnover (sales/assets)</td>
<td>Declines</td>
<td>Declines</td>
</tr>
</tbody>
</table>
Expected future equity tunneling

- probability = $\pi_{eq, \text{pre}}$; fraction of value = $d_{eq}$
  - equity dilution: assume (for simplicity) firm issues new shares to insiders for zero price

$$MV_{0, \text{eq tun}} = \frac{\left(1 - \pi_{eq, \text{pre}} d_{eq}\right) \cdot ROA_0 \cdot A_0}{K_0}$$

- **Affects**: metrics based on price (P/E, q)
- **Doesn’t affect**: financial statement metrics
Realized equity dilution

- Expected future probability and discount change

\[ MV_{1,tun} = (1 - d_{eq}) \times \left(1 - \pi_{eq,post} d'_{eq}\right) \times \frac{ROA_0 \times A_0}{K_0} \]

- Still no effect on financial statement metrics
- Past dilution: no direct effect on cost of equity or P/E
  - P/E: More shares \(\rightarrow\) Lower P, lower E
    - P affected by expected future dilution
  - Cost of equity = inverse of P/E
Equity tunneling even if pay market price

• Market price reflects all tunneling risks:

\[ MV_{0,tun} = \frac{(1-d_{cf})(1-\pi_{a,pre}d_{syn})(1-\pi_{a,pre}d_{a})(1-\pi_{eq,pre}d_{eq})}{K_0} \cdot ROA_0 \cdot A_0 \]

• Implication of tunneling risk
  – freezeout or equity sale at market can be dilutive
    • freezeout or sale at discount to market: double hit
    • insiders can manipulate price (through trading, disclosure)
  – asset sale to insiders can be dilutive if value estimated from market value of shares
  – hence can’t base appraisal remedy solely on market price
Tunneling and Metrics: An Illustration

\[ A_0 = 1, \quad \text{ROA}_0 = 10\%, \quad K_0 = 10\%, \quad d_{cf} = 0.25, \quad d_{eq} = d_a = \pi_{eq} = \pi_a = 0.5, \quad d_{syn} = 0.1 \]

post-tunneling probabilities of further tunneling= 0
Extend to infinite time

Start with formula above:

$$MV_0 = \frac{(1-d_{cf})(1-\pi_{a, pre}d_{syn})(1-\pi_{a, pre}d_a)(1-\pi_{eq, pre}d_{eq}) \ast ROA_0 \ast A_0}{K_0}$$

Ignore synergy, add growth, let $\pi_a d_a = \delta_a$, $\pi_{eq} d_{eq} = \delta_{eq}$, sum over $t=(1, \infty)$

Similar to standard compound (Gordon) growth model:

$$MV_0 = [ROA_0 \ast A_0 \ast (1-d_{cf})]\ast \left[\frac{1}{(K_0-g+\delta_{eq}+\delta_a+(\Sigma\text{interaction terms})}\right]$$

$$= CF_0 \ast \left[\frac{1}{(K_0-g+K_{tun})}\right]$$

$$K_{tun} = [\delta_{eq} + \delta_a + \Sigma\text{(interaction terms)}]$$

interaction terms: $[- (d_{eq} \ast d_a) + (d_{eq} \ast g) + (d_a \ast g) - (d_{eq} \ast d_a \ast g)]$

$\delta_{eq} + \delta_a$ look like asset pricing factors
Tunneling and classic asset pricing factors

- $\Delta K_{\text{tun}} \rightarrow \Delta(\text{price})$

- Which standard asset pricing factors are likely to be correlated with $K_{\text{tun}}$?
  - $\beta$, momentum = no obvious connection
  - size: larger firms more visible $\rightarrow$ higher tunneling cost $\rightarrow$ less tunneling ($\%$ of $MV_{\text{no-tun}}$)
  - market/book: responds directly to tunneling risk

- So, tunneling risk will load on size and M/B
  - Will look like (and contribute to) these classic factors
  - New explanation for size, M/B factors!
Case studies: Gazprom

• Gazprom is great fun
  – raw tunneling
    • one transaction alone: gas field worth > $400M (per PWC) sold to Itera for $1,200
    • PWC “could not confirm” who owns Itera
  – huge dollars
    • one estimate: total transfers to Itera = $30B
  – double discounts
    • insiders bought Gazprom shares in 1990s from gov’t at discounts to already hugely discounted market prices
      – market value/(barrel of reserves) = $0.026 in 1999
      – up 50-fold to $1.40 by 2008
      – still only 10% of Western multiples
Coke and Coke Bottling (1986-2008)

• Coke spins off Coke Bottling -- IPO in late 1986
  – Coke keeps 49%
  – Coke-affiliated directors control Bottling board
  – Coke deconsolidates Bottling (claims no control!?)

• Asset tunneling “in” (to Bottling)
  – Coke sells bottling plants to Bottling
  – prices far above book value

• Bottling pre-tax cost of capital ≈ 8-9%

• 1990 = last year in which Bottling had 7% ROA
  – since then, 4%-6% (worst under Goizueta, thru 1996)
  – miserable share price performance
  – (very) overcompensated CEO
Was there tunneling, and what kind?

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<tbody>
<tr>
<td>Gross Margin</td>
<td>0.463</td>
<td>0.372</td>
<td>0.006</td>
</tr>
<tr>
<td>(Depreciation and Amortization)/sales</td>
<td>0.069</td>
<td>0.044</td>
<td>0.000</td>
</tr>
<tr>
<td>Operating Margin (EBIT/sales)</td>
<td>0.075</td>
<td>0.090</td>
<td>0.040</td>
</tr>
<tr>
<td>EBITDA/assets</td>
<td>0.101</td>
<td>0.139</td>
<td>0.000</td>
</tr>
<tr>
<td>ROA (EBIT/assets)</td>
<td>0.053</td>
<td>0.095</td>
<td>0.007</td>
</tr>
<tr>
<td>Other Long-Term Assets (Intangibles)/Total Long-Term Assets</td>
<td>0.728</td>
<td>0.392</td>
<td>0.000</td>
</tr>
<tr>
<td>Tobin’s q</td>
<td>1.248</td>
<td>1.642</td>
<td>0.274</td>
</tr>
<tr>
<td>Price/Earnings</td>
<td>44.503</td>
<td>29.206</td>
<td>0.008</td>
</tr>
</tbody>
</table>

No evidence for cash flow tunneling
Strong evidence for asset tunneling “in”: Bottling overpays Coke for bottling plants
Best available peers: four firms, one Canadian, 3 affiliated with Pepsi
Summary: Asset Tunneling In

• Over time, Coke sells bottling assets to Coke Bottling
  – ↑ (assets), ↑ (D&A) ➔ ↓↓ ROA
  – by 2001: $6B goodwill out of $8.6B total Bottling assets
• For normal ROA (0.07), Bottling needed to pay $5B less!
• Minimal Disclosure
  – “Bottling bought plant X from Coke for $Y”
    • sometimes omits assumed debt, which is most of purchase price
  – Later -- “Total asset purchases from Coke since IPO are $Z”
  – With current disclosure rules: only way to detect asset tunneling is indirect . . . and slow (emerges over time_
    • Excess D&A
    • suppressed ROA
• Shareholder suits claiming tunneling failed.
Payoffs from Project

• Payoffs from effort to unbundle, measure tunneling:
  – Guide to tunneling research
  – Asset pricing implications
  – Policy implications:
    • even in US, large scale tunneling can be minimally disclosed
    • goal of financial reporting: Tell investors what they need to know to value firms
      – for tunneling, long way to go
Tunneling Disclosure

• Predict: Better disclosure \(\rightarrow\) less tunneling
  – Won’t help for freezeouts

• How to test?
  – Run equivalent of drug trial
  – Randomize firms into treated, controls
  – Require treated firms to disclose [whatever] for say 5 years.
Near-term Effects

• Event study of investor reaction when treated and control firms are disclosed
  – With longer term followup to see if investors are right
  – If event study is clear enough, can extend to all firms, without waiting for experiment to end

• With sufficient sample, can study range of “treatments”
  – Can run multiple studies in parallel
Shareholder voting rules

• Minority shareholder approval for suspect classes of transactions
  – Majority vs supermajority
  – Layered approval
    • Independent directors first
      – They can negotiate
      – Some will be truly independent, others won’t be
    • Followed by minority shareholder vote
Voting rights experiments

• Can run experiments here too
  – Study value of voting rights
    • Shares versus options using put-call parity
  – Prospective
  – And retrospective, for past events
Big picture idea

• To achieve world-class securities regulation
  – Don’t just guess
  – Or copy others, like the US

• Experiment!
If you are interested . . .

• Come talk to us!
• We can help with research design
• Made similar pitch to US SEC
  – At least to the economists
  – Not sure they are listening